

Amendments to the Specification

Page 4, line 21 through page 6, line 10:

For a given fixed \mathbf{p} , there are many different feasible \mathbf{f} s. Let $\mathbf{f}^m(\mathbf{p})$ be the flow vector which gives maximum R for the corresponding \mathbf{p} . That is

$$\max_{\mathbf{p}} R = \mathbf{p} \cdot \mathbf{f}^m(\mathbf{p})$$

For any given ~~positive~~ arbitrarily chosen positive number λ , the following relationship will apply:

$$\mathbf{f}^m(\mathbf{p}) = \mathbf{f}^m(\lambda \mathbf{p})$$

Then $\mathbf{f}^m(\mathbf{p})$ for all possible \mathbf{p} represents a curve in E^K and is called the maximum-flow-frontier (MFF). Those skilled in the art will understand that the MFF is a continuous and convex curve.

To maximize the network revenue is simply to allocate the network flow as $\mathbf{f}^m(\mathbf{p})$ for a given network and price vector. Usually, the network resources remain relatively stable, and thus the MFF is remains stable. ~~However, the price vector \mathbf{p} fluctuates dynamically.~~ There are approximate algorithms to find $\mathbf{f}^m(\mathbf{p})$ for a given \mathbf{p} . However, the price vector \mathbf{p} fluctuates dynamically. There are approximate algorithms to find $\mathbf{f}^m(\mathbf{p})$ on a timely basis and, correspondingly, allocation of the network flow to the computed $\mathbf{f}^m(\mathbf{p})$, becomes difficult, if not impossible, if the computation speed $\mathbf{f}^m(\mathbf{p})$ is slower than the fluctuation speed of \mathbf{p} . For example, when the value $\mathbf{f}^m(\mathbf{p}(t-\tau))$ is computed, the current price vector $\mathbf{p}(t)$ may be $2\mathbf{p}(t-\tau)$ or $\mathbf{p}(t-\tau)/2$. The computed frontier $\mathbf{f}^m(\mathbf{p}(t-\tau))$ may give a revenue which is far from the maximum revenue. Therefore, in accordance with the invention, instead of computing the $\mathbf{f}^m(\mathbf{p})$ on-line, as with prior-art methods, the

method of the invention first constructs the MFF off-line then finds the right $\mathbf{f}^m(\mathbf{p})$ through a fast method for on-line computation.

The method of the invention will be better understood by reference to the figures, and to the description below. Considering Figures 1 and 2 together, Figure 1 schematically depicts an typical data network configuration having multiple data paths between network nodes and Figure 2 graphically illustrates an exemplary three-dimensional multi-commodity data flow among, for example, the three primary nodes A, B, & C of Figure 1. Data flows between nodes A 100 and B 110 are represented by flow F_1 in Figure 1. Also, in Figure 1 data flows between nodes B 110 and C 120 are represented by flow F_2 and, data flows between nodes C 120 and A 100 are represented by flow F_3 . In Figure 2, point f1 200 on flow F_1 , point f2 210 on F_2 , and point f3 220 on flow F_3 represent the maximum single commodity data flow between the respective nodes. The single commodity flow values may be determined using linear programming techniques such as disclosed by Garg and Konemann, *id.* The points f1, f2 and f3 are also known as the pivots for their respective commodities.